

# **ALTERNATIVE ENERGIES AND ADVANCED MILITARY CAPABILITIES**

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# AGENDA

- Why?
- Which Alternative Energies?
- How hard is this?
- Strategic Framework
- Current efforts
- Ideas and Examples
- Conclusion

# **DoD ALTERNATIVE / RENEWABLE ENERGY?**

... The earth is finite. Fossil fuels are not renewable. In this respect our energy base differs from that of all earlier civilizations. They could have maintained their energy supply by careful cultivation. We cannot. Fuel that has been burned is gone forever.

In the face of the basic fact that fossil fuel reserves are finite, the exact length of time these reserves will last is important in only one respect: the longer they last, the more time do we have, to invent ways of living off renewable or substitute energy sources and to adjust our economy to the vast changes which we can expect from such a shift.

# DoD ALTERNATIVE ENERGY

## WHY?

- Better Developed (primarily installations)
  - Energy Efficiency
  - Cost Savings
  - Slew of new regulations for environmental
- Less Developed (operational forces)
  - Variability and cost of petroleum products
  - General recognition of U.S. reliance/susceptibility on LOCs / reduced freedom of maneuver
  - Growth of “anti-access” technologies
  - GROWING energy requirements for operational capabilities
- No need for altruism

# ALTERNATIVE ENERGIES

## WHAT ARE THEY?

- Nuclear
- Solar
- Wind
- Hydro
- Geothermal
- Biomass (Incl algae; cellulosic; catalytic, etc))
- Waste-To-Energy
- Thermo-electric
- Fuels Cells / Bio-batteries

# “UNIVERSE” OF DoD ALT ENERGY

	Installations	Operational Forces
Mobility (fuels)	Military Systems Non-Tactical Vehicles	Aviation Land Forces Ship Propulsion
Power Generation & Storage	Electrical Grid Utilities	Power Generation Power Storage (batteries)

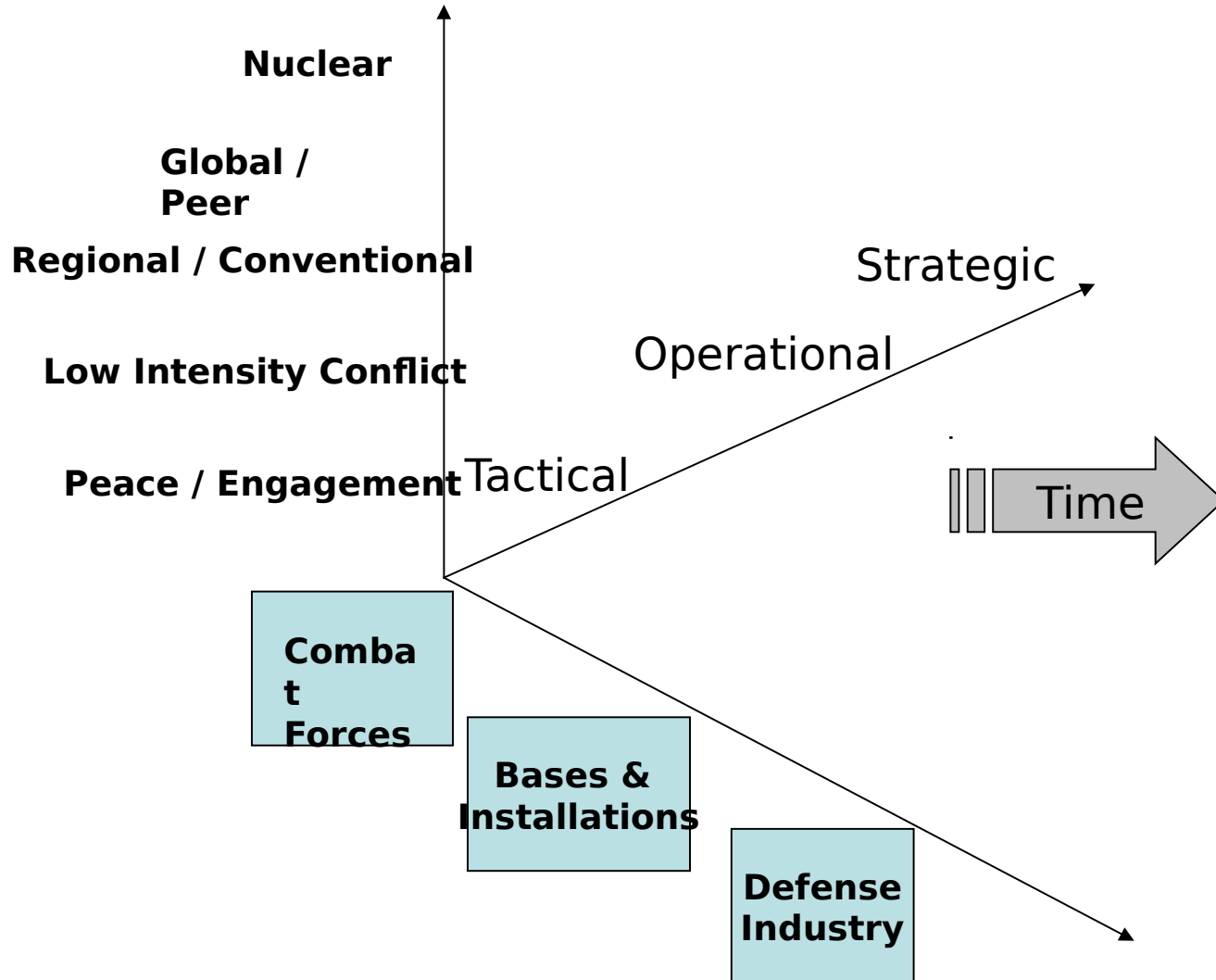
**Different Challenges and Opportunities - Ex: Wind/Solar/Geot**

# HOW HARD CAN THIS BE?

- Petroleum
  - Scale of the system
  - Utility of the product
- Energy Efficiency
  - Engines
  - Power Storage
  - Thermodynamics
- Alt energy efficiencies
- Alternative energy limits/liabilities
  - Solar/Wind/Waste/Biomass
- Engineering / safety / environmental issues (ex: nuclear; biomass)
- No immediately obvious/good answer

# STRATEGIC FRAMEWORK

PRELIMINARY (Four Dimensions > Result)





# CURRENT EFFORTS

- Strategic / Analytical Efforts
  - Organizational Changes
  - New Energy Strategies (Army - Jan 13 2009)
  - OSD, Director Operational Energy Plans and Programs
  - “Fully Burdened Cost of Fuel”
- Studies
  - Defense Science Board
  - Office of Net Assessment
  - Naval Postgraduate School
- R&D
  - DARPA (batteries, alt fuels)
  - Service SBIR/STTR
  - Installation SERDP/ECSTP
  - Gov’t investment in Alt Energy \$3B 2007 / MD \$26B

# IDEAS and EXAMPLES

- Advanced Future Logistics (OSD-NA 2008)
  - “Back to the Future”
    - Incorporate / leverage new energy S&T to return to earlier field skills on foraging, conservation, reutilization, autonomous operations
- “Live” off of supply line waste/materials
  - Design materials (packaging, construction, etc.) to be dual use
  - Primary mission/energy feedstock
- “Flex-Fuel” everything (Engines that run off of anything from vegetable oil, to gasoline to JP-8)
- Nuclear “gensets” (adapt propulsion packs to land forces)

# CONCLUSION

- Alt energy for operational capabilities needed
- No need for altruism
- This is really hard & difficult work
- Affects Technology / Doctrine / Force Structure / Acquisition
- Rhetoric to Funding ratio poor
- Growing recognition (even USAF/USN)

# Joint Navy - USAF Mobile Renewable Energy Project

**CVX -**

**“Arnold Palmer”**

**A hybrid  
nuclear  
-biomass  
system**

